

**IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK**

AMPLIFY EDUCATION, INC.,

Plaintiff,

V.

GREENWOOD PUBLISHING GROUP,
INC. d/b/a heinemann,

Defendant.

Civil Action No. 1:13-cv-02687-LTS-RLE

**DECLARATION OF RAVIN BALAKRISHNAN, Ph.D.
REGARDING THE PROPER CLAIM CONSTRUCTION OF
DISPUTED TERMS IN HEINEMANN'S U.S. PATENT NO. 6,299,452**

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I. INTRODUCTION

1. My name is Ravin Balakrishnan. I am a tenured Professor in the Department of Computer Science at the University of Toronto in Canada.

2. I understand that Greenwood Publishing Group, Inc. d/b/a Heinemann (“Heinemann”) has asserted a counterclaim which asserts that Amplify Education, Inc. (“Amplify”) infringes Heinemann’s U.S. Patent No. 6,299,452 (“the ’452 patent”), entitled “Diagnostic System and Method for Phonological Awareness, Phonological Processing and Reading Skill Testing.”¹

3. I have been retained in this case by Heinemann to provide my conclusions regarding the meaning of the following claim terms used in the ’452 patent, as understood by a person of ordinary skill in the art at the time of the ’452 invention:

Claim Term
“means for displaying at least one of a graphical image and audio” (claim 1)
“means for providing at least two stimuli” (claims 7, 58)
“means for displaying a visual stimulus” (claims 16, 67)
“means for receiving a user response” (claims 1, 11, 14, 62, 65)
“means for receiving user input” (claims 7, 58)
“means for receiving a response” (claims 8, 9, 10, 12, 16, 59, 60, 61, 63, 67)
“means for receiving a user’s response” (claims 17, 68)
“means for generating a response to the tests” (claim 52)
“means for segmenting the stimulus into smaller units” (claims 12, 63)
“means for manipulating the sound units of the sound stimulus” (claims 13, 64)
“means for speaking a/the verbal response into the speech recognition device” (claims 6, 57)
“means for speaking the name of or the sound associated with the visual stimulus” (claims 15, 66)
“means for communicating the responses for each test back to the server computer” (claim 1)
“means for downloading one or more tests” (claim 52)
“means for receiving a recommendation” (claim 52)
“means for receiving a score” (claim 52)
“means for receiving responses” (claim 35)

¹ I also understand that Amplify alleges that Heinemann infringes U.S. Patent Nos. 7,114,126 and 7,568,160 (“the ’126 patent” and “the ’160 patent,” respectively). I understand that, pursuant to the *Markman* briefing schedule set by the Court, Amplify is concurrently submitting an opening brief regarding the construction of disputed terms of those patents, to which Heinemann will file a responsive brief on July 21. I reserve the right to submit a declaration in connection with Heinemann’s responsive brief with respect to the proper construction of the disputed claim terms of the ’126 and ’160 patents.

Claim Term
“means for receiving a response” (claims 42, 43, 44)
“means for receiving a user response” (claims 45, 48)
“means for receiving a user’s response” (claim 51)
“means for generating ... stimulus” (claims 42-44,)
“means for generating ...stimulus” (claims 8-10, 12, 59-61, 63)
“means for generating at least two sound stimuli” (claims 11, 62)
“means for generating at least two sound stimuli” (claim 45)
“means for generating a sound stimulus having one or more sound units” (claims 13, 64)
“means for generating at least one sound stimulus” (claims 14, 48, 65)
“means for generating at least one sound stimulus” (claim 48)
“means for generating at least one visual stimulus” (claims 15, 66)
“means for generating a plurality of visual stimuli” (claims 17, 51, 68)
“means for generating a plurality of visual stimuli” (claim 51)
“individual” (claims 1, 3, 18-21, 35, 37, 52, 54)
“user” (claims 1, 4, 6-7, 10-11, 14, 16-17, 18, 21, 23-24, 27-28, 31, 33-34, 44-45, 48, 51, 55, 57-58, 61-62, 65, 67-68)
“test taker” (claims 8-9, 25-26, 42-43, 59-60)
“client computer” (claims 1, 4, 55)
“server computer” (claims 1, 52)
“server” (claims 2, 35-37, 39, 42-45, 48, 51-52)
“scorer” (claims 1 and 35)
“scoring” (claim 18)
“test” (claims 1, 4-5, 7-17, 18, 21-22, 24-34, 35, 39, 42-45, 48, 51, 52, 55-68)
“receiving a user/user’s response” (claims 1,11, 14, 17, 28, 31, 34, 62, 65, 68)
“receiving a response” (claims 8-10, 12, 16, 18, 25, 27, 29, 33, 59-61, 63, 67)
“receiving user input” (claims 7, 24, 58)
“receiving a user/user’s response” (claims 45, 48)
“receiving a response” (claims 42-44)
“receiving responses” (claim 35)
“presenting” (claim 18)
“displaying at least one of a graphical image and audio” (claim 1)

II. QUALIFICATIONS

4. A complete listing of my qualifications and publications is set forth in my curriculum vitae, attached hereto as Exhibit 1. Below, I briefly highlight some of my experience that directly relates to the technology at issue in this case.

5. I earned my B.Sc. (1st Class Honours) degree in Computer Science from the University of New Brunswick, Canada, in May 1993. Subsequently, I received my M.Sc. and

Ph.D. degrees in Computer Science from the University of Toronto, Canada, in January 1997 and February 2001, respectively.

6. As an undergraduate, I worked as a research assistant in a human interface lab, working with different kinds of novel user interface and input technologies. Since then, I have either trained or worked in the field of human-computer interfaces, including researching and developing novel interfaces and visualizations for touch sensitive input devices, multiple degree-of-freedom input devices, two-handed input, multi-touch input, haptic feedback interfaces, tablet-based input, large and small scale displays, and interactive 3D graphics.

7. I have published over one hundred refereed publications in the field of human-computer interaction. I have further presented numerous conference abstracts, posters, lectures, and demonstrations in my field. I am a named inventor on eighteen issued patents in my area of work, plus an additional three pending (though not yet issued) patents.

8. I joined the University of Toronto faculty in July 2001 as an Assistant Professor. In 2006, I was promoted to Associate Professor with tenure, and in 2011 was promoted to full Professor. As a professor, I have taught numerous undergraduate and graduate courses in topics related to human-computer interaction. Ten Ph.D. students and 26 research masters students have completed their degrees and research under my supervision, and eight postdoctoral fellows have completed their research training under my supervision. In addition to these graduate students and postdoctoral fellows, I currently supervise five Ph.D. students and one Masters student. In addition to my professorship, I also hold the Canada Research Chair in Human-Centered Interfaces in the Department of Computer Science, and I co-direct the Dynamic Graphics Project laboratory.

9. My research at the University of Toronto has involved nearly every aspect of human-computer interaction and data visualization. For instance, I have done significant work in the areas of input devices, sensing technologies, and interaction techniques, in particular touch and multi-touch interaction, gestural, sketching, haptic feedback interfaces, multi degree-of-freedom interaction, interfaces to small and/or mobile computers, and interfaces to displays of the future. As another example, I have done work in the evaluation of user interfaces, including associated metrics and predictive models of human performance. I have previously served as a visiting researcher at Mitsubishi Electric Research Laboratories, Microsoft Research, and Hewlett-Packard Labs. My research program has been funded by leading companies such as Microsoft, IBM, and Hewlett-Packard, and also organizations such as the National Sciences and Engineering Research Council of Canada and the Sloan Foundation.

10. I have also served on the organizing and paper reviewing committees of many leading conferences in my field, and have taken on editorial roles for leading technical journals in fields pertinent to my research. For example, I am currently an Associate Editor of “ACM Transactions on Computer-Human Interfaces” (the premier journal in the field), and was previously an Associate Editor of the journal “IEEE Transactions on Visualization and Computer Graphics.” Similarly, I have been the papers chair for the ACM UIST Symposium on User Interface Software and Technology, and have served multiple times as an Associate Chair for the premier ACM CHI Conference on Human-Computer Interaction.

11. I have also received many awards and honors in my field, including: the Alfred P. Sloan Research Fellowship; ten best paper awards and honorable mentions at the leading conferences in my field; the Ontario Premier’s Research Excellence Award; and election to the

ACM SIGCHI Academy in 2011, which honors the principal leaders in the research field of human-computer interaction.

12. As set forth in my curriculum vitae, I have over twenty years of experience studying and teaching computer programming. I have been a professor of Computer Science for over twelve years. I can read and program using both procedural and object-oriented programming languages fluently.

13. I have previously prepared expert reports and testified as an expert in connection with International Trade Commission investigations and District Court cases. A complete listing may be found in my attached curriculum vitae.

14. With a broad knowledge of graphical user interfaces, a solid grounding in the specific technologies employed by mobile devices, a historical perspective based on active personal participation in the graphical user interface industry, and experience with the patent process, I believe that I am qualified to provide an accurate assessment of the technical issues in this case.

III. LEGAL PRINCIPLES

15. I am not an attorney, but I understand that the following principles apply to patent claim construction.

16. I understand that the words of a claim are generally given their ordinary and customary meaning, which is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the patent application. As of the effective filing date of the patent (as set forth on the cover page) at issue here (in the late 1990s), I would have been at least a person of ordinary skill in the art as I describe further herein.

17. I understand that, for claim construction, one must focus on the claim terms in the context of the claim as a whole. I also understand that the claims must be read in light of the specification, which is always highly relevant to the meaning of a claim term, and is the single best guide to the meaning of a disputed term.

18. I understand that the prosecution history of a patent may also be considered when construing the claims of the patent. The prosecution history provides evidence of how the U.S. Patent and Trademark Office and the inventor(s) understood the patent.

19. I understand that, collectively, these sources—the claim language, specification, and prosecution history—are called “intrinsic evidence.”

20. In addition, I understand that a court may also consider other “extrinsic” evidence in the field—such as expert testimony, dictionaries, and treatises—to determine how a person of ordinary skill in the art would understand the claimed invention. I understand that this type of evidence should be considered in the context of the intrinsic evidence.

21. I understand that 35 U.S.C. § 112(f) recites that: “An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.” Limitations that recite the word “means” are presumptively interpreted under 35 U.S.C. § 112(f).

22. I understand that the construction of a means-plus-function limitation under 35 U.S.C. § 112(f) requires a two-step approach. The first step is to identify the claimed function, staying true to the claim language and the limitations expressly recited by the claims. One must be careful not to adopt a function different from that explicitly recited in the claim, because an

error in identification of the function could improperly alter the identification of the structure corresponding to that function. The second step is to ascertain the corresponding structures in the written description that perform those functions. A disclosed structure is corresponding if the specification clearly links or associates that structure to the function recited in the claim. I understand that it is improper to import into the claim, structural limitations from the written description that are unnecessary to perform the claimed function.

IV. THE '452 PATENT

23. The '452 patent generally relates to a system, method, and apparatus for diagnosing deficiencies in one or more reading or pre-reading skills, and then based on the diagnoses recommending training tools to help improve deficient skills. The patent describes tests in different areas of phonological awareness, phonological processing, verbal short term memory, rapid access naming, phonemic decoding and reading fluency. Phonology is the study of the distribution and patterning of speech sounds in a language and of the tacit rules governing pronunciation.

24. In the preferred embodiment, the system is implemented using a client-server architecture, where a user—which may be the student, a parent, teacher, or other person—interacts with a client computer by responding to various graphical or audio stimuli, and a server scores those responses and recommends additional training based on those scores. Below I discuss some of these technical concepts to provide context to the invention and the terminology used in the claims.

25. In addition to reviewing the '452 patent and its file history, I have also reviewed U.S. Patent No. 6,146,147 (Appl. No. 09/039,194) that is incorporated by reference by the asserted patent. I understand that the '147 patent disclosure is to be considered a part of the '452

patent and can be used in interpreting the claims of the '452 patent, including the means-plus-function claim terms at issue in this case.

26. I believe that a person of ordinary skill in the art for the '452 patent would have been someone with the skills necessary to successfully design and implement a computing system for testing reading deficiencies. Such a person would have at least a B.S. degree in computer science, computer engineering, or electrical engineering, (or equivalent experience), and would have at least two or three years of experience with user-interface design.

27. My personal background by the late 1990s (the '452 patent was applied for in 1999) included basic and applied research and development of a variety of user interfaces and systems as previously described in the "Qualifications" section. I therefore met or exceeded the level of ordinary skill by the time of the '452 invention, and have performed my analysis consistent with that level of ordinary skill in the art at the time of the '452 invention.

A. Communication between Client and Server in a Client-Server Architecture

28. Client-server architecture is designed to split tasks between user-facing, front-end functionality—*e.g.*, displaying graphics to a user—and non-user-facing, back-end functionality—*e.g.*, computing statistics based on user inputs. The "client" typically provides the front-end functionality that the user interacts with directly. The "server" typically provides certain back-end functionality that the user does not directly observe. Typically, one server can provide back-end functionality for several different clients operated by different users.

29. A common client-server example is accessing a web page over the Internet. Two users, for example, may operate different clients. The first user may be operating a laptop computer, while the second user may be operating a tablet computer. Both users may request a document from a server via the Internet, *e.g.*, the local patent rules available at

http://www.nysd.uscourts.gov/rules/Standing_Order_In_re_Local_Patent_Rules.pdf.

30. The server can receive requests from both clients, process those requests, and deliver the requested Web page to each client.

31. While typically client-server architecture is described at the macro level—*i.e.*, where each client and server is a standalone computer or similar device—client-server architecture can also be useful and implemented on a smaller scale, such as within a single device. For example, a single computer can implement a system whereby a server module runs independently and serves data to one or more clients. This might occur in a 3D graphics application where the user might have multiple client windows open, each handling a different geometric model, while the server handles the retrieval and saving of those models with the file system. Such an architecture could be implemented by having each of the server and client processes running on independent threads on a single processor, or having the processes distributed across multiple processors if available. In either situation, the clients would communicate with the server via an established inter-process communications protocol.

B. Client Output

32. Clients are often user-facing, and therefore are used to output data, such as graphics or audio, to a user. There are many different ways to output data to a user. Common output devices for presenting graphics and other visual stimuli include cathode ray tube (CRT)-, LCD-, or plasma-based displays. Common output devices for presenting sound and other audio stimuli include speakers and headphones.

C. Client Input

33. Users may interact with clients by responding to the graphical or audio stimuli presented by clients via inputs. Inputs can be haptic and/or auditory, and a variety of input devices can be used. Common input devices for responding to graphical stimuli include a keyboard, mouse, joystick, track ball, touch screen, pen, and touch pad with on-screen buttons.

Common input devices for providing audio inputs include a microphone, which may be further coupled with speech recognition software to provide further processing of the input.

D. Client-Server Communications

34. Clients and servers may interact with one another by sending data—*e.g.*, user responses—back and forth between one another. Clients and servers interact using a communications protocol. A protocol is a set of rules that defines how two components can interact, such that they understand each other. Put another way, it is the common language two components must speak in order to understand each other when they communicate.

35. In the Internet example above, clients and servers interact using the “Hypertext Transfer Protocol” or HTTP. HTTP is a standard developed by the Internet Engineering Task Force (IETF) and World Wide Web Consortium (W3C) that defines how devices are to interact with each other over the Internet. If both a client and server support HTTP, they can understand communications from one another and interact with each other.

36. In other client-server architectures, such as a client-server architecture within a single device, other communication protocols may be used. For example, sockets are a commonly used protocol for communications between processes.

37. A client can also include a web browser. A browser is a client application that enables a user to view HTML documents (*e.g.*, Web pages) on the World Wide Web, another network, or a client-computer. Web browsers are also able to render the HTML documents on the display in the format specified by the document itself.

E. Algorithms

38. An algorithm is a computer program that details a series of steps to accomplish a specific task or generate a result. One common way to express an algorithm is through flow charts that detail the steps and process flow of an algorithm. The ’452 patent discloses different

algorithms to test different areas of phonological awareness, phonological processing, verbal short term memory, rapid access naming, phonemic decoding and reading fluency. Specifically, the '452 patent discloses algorithms in the flow charts shown in Figures 4, 5, 7, 9A, 9B, 11, 13, 15, 17, 19, 21, 23, 25, and 27.

F. Scorer / Scoring

39. The concept of scoring was well-understood by persons of ordinary skill in the art in the late 1990s at the time of the '452 invention. Indeed, keeping track of data such as scores is a function for which computers are particularly well-suited. Scoring in a computer is performed by a scorer, which can be implemented in either hardware or software, and simply keeps track of a user's responses and determines whether they match an expected response, *i.e.*, determining whether they are "right," and/or keeps track of statistics related to those responses. A person of ordinary skill in the art at the time of the invention would understand what a scorer is in the context of the '452 invention.

G. The Invention of the '452 Patent

40. Each embodiment disclosed in the '452 patent includes: (1) presenting a test for testing a particular reading or pre-reading skill on a display; (2) receiving a response to each test via an input device; (3) scoring the responses; and (4) recommending, based on the scores of one or more tests, one or more training modules for improving a reading or pre-reading skill as indicated by the score.

41. In Figures 5, 7, 9A, 9B, 11, 13, 15, 17, 19, 21, 23, 25 of the '452 patent, the named inventors provide algorithms for generating different tests related to reading or pre-reading skills. These tests include: recognizing rhymes, generating rhymes, distinguishing between the beginning and ending sounds of words, blending sounds, segmenting sounds, manipulating sounds, recalling spoken words in sequential order, rapidly naming visually-

presented items, testing letters and associating a phoneme sound with a letter, decoding words, and fluent reading.

42. The inventors explain that the tests can be performed by a various users, including the parent of a child or a test administrator:

Each client computer 54 (Client #N will be described herein, but it should be realized that each client computer is substantially similar) may be used by an individual user, such as a parent of a child or a test administrator, to access the diagnostic tool stored on the server.

'452 patent at 6:34-38.

The diagnostic tool 66 may also use a child's scores on the one or more tools in order to recommend to the user of the client computer (e.g., the parent of the child) which training tools the parent may consider downloading to help the child with any deficiencies.

Id. at 6:64-67.

The parent may then download the training tool from the system. The recommender permits a parent of the child, who has no experience or knowledge about reading disorders or phonological awareness and processing deficits, to have their child tested for these deficits at home and then have the system automatically recommend a training tool that may help the child improve in any deficient areas.

Id. at 7:58-65.

In step 142, the questionnaire may display a first question to the user of the client computer, such as the parent of the child being tested.

Id. at 9:27-29.

43. Further, the file history discloses that “[t]he system permits people with various different knowledge levels and at various different locations to administer the diagnostic test. For example, a parent (with no knowledge of reading skills or how to diagnose the deficiency or train them) may use the system to diagnose a deficiency in his/her child from the comfort of the home.” '452 File History, 3/30/2001 Response to Office Action dated 11/7/2000 at 5.

Moreover, a person of ordinary skill in the art would understand that inputting a response into a

client may be difficult for the person being tested (*e.g.*, a young child or someone with impaired faculties), and would therefore require assistance from a parent, teacher, test administrator, or other skilled person.

V. CLAIM CONSTRUCTION ANALYSIS

44. I have been asked to provide my conclusions regarding the meaning of the claim terms listed above.

45. Based on my reading of the patents, the file history, and my technical experience in the field of user interfaces and client-server architectures and communications, I set forth below my analysis and conclusions regarding the proper construction of the claim terms in dispute.

A. Means-Plus-Function Terms

46. There are 30 means-plus-function terms in dispute. With two exceptions, the parties agree what the claimed functions are for each term. While there are 30 individual terms that the parties have proposed for construction, they can be grouped into three general categories and be analyzed together for efficiency, with minor differences that I explain below.

(i) **Means-Plus-Function Terms Relating To Output By A Client Computer or Apparatus**

Claim Term	Agreed Function	Heinemann's Proposed Structure	Amplify's Proposed Structure
"means for displaying at least one of a graphical image and audio" (claim 1)	displaying at least one of a graphical image and audio	'452 Patent: Display 78 shown in Figure 1; a display 78 such as a typical cathode ray tube, a flat panel display or the like; and/or speaker.	Display 78 (Fig.1) & Browser 80 (Fig.1) &
"means for providing at least two stimuli" (claims 7, 58)	providing at least two stimuli		Speaker (col. 11, lines 13-15) & HTTP
"means for generating ... stimulus" (claims 8, 9-10,	generating ...		

12, 59-61, 63)	stimulus	<u>'147 Patent</u> : Display 16 and/or Speaker 24 shown in Figure 1.	protocol (col. 6, lines 6-13).
“means for displaying a visual stimulus” (claims 16, 67)	displaying a visual stimulus	<u>'452 Patent</u> : Display 78 shown in Figure 1; a display 78 such as a typical cathode ray tube, a flat panel display or the like.	
“means for generating at least one visual stimulus” (claims 15, 66)	generating at least one visual stimulus		
“means for generating a plurality of visual stimuli” (claims 17, 68)	generating a plurality of visual stimuli		
“means for generating at least two sound stimuli” (claims 11, 62)	generating at least two sound stimuli	<u>'452 Patent</u> : speaker.	
“means for generating a sound stimulus having one or more sound units” (claims 13, 64)	generating a sound stimulus having one or more sound units	<u>'147 Patent</u> : speaker 24 shown in Figure 1.	
“means for generating at least one sound stimulus” (claims 14, 65)	generating at least one sound stimulus		

47. The first category of means-plus-function terms relate to output by a client, including graphical/visual output, as well as audio output. I understand that the parties agree that the disputed terms are means-plus-function terms and that both parties agree on the function associated with each term. In addition, I understand that the parties agree that the corresponding structure includes a display where the function is limited to a "visual" stimulus, a speaker where the function is limited to an auditory stimulus, and both a display and speaker where the stimulus may be visual or auditory.

(a) Heinemann's Proposed Constructions Are Correct

48. I understand that the dispute between the parties centers on whether or not the terms should be construed to add additional structure—a browser and HTTP protocol—as Amplify proposes. Based on my examination of the claims and specification, I conclude that a browser and HTTP protocol are unnecessary to perform the claimed functions, and therefore should not be imported into the claimed structural elements.

49. The '452 specification confirms that the structure for displaying, providing, or generating graphical images or visual stimuli is a display, such as a typical cathode ray tube, flat panel display, or something similar. '452 patent at 11:13-15 (“In step 212, the module may **generate** a word sound on the speaker of the user’s computer and may **display an image** of the word being spoken.”)²; *see id.* at 6:38-44 (“Each client computer 54 may include ... **a display 78, such as a typical cathode ray tube, a flat panel display, or the like.**”); *id.* at 8:3-5 (“For example, the child may see one or more items on the **computer screen** in rapid succession...”); *id.* at 8:22-24 (“Each test 102 may **display images on the display** of the client computer...”).

50. Likewise, the specification confirms that audio may be displayed, presented, or generated using a speaker. *See id.* at 11:13-14 (“In step 212, the module may **generate a word sound on the speaker of the user’s computer** and may display an image of the word being spoken.”), *id.* at 15:7-9 (“In step 452, a sequence of words and/or digits is spoken with equal intervals between each word or digit through the **speaker of the computer** to the user.”); *see also* '147 patent at 3:11-13 (“The system includes a **speaker system which provides the audible part** of the games”), *id.* at 3:46-47 (“A **speaker, or speaker system**, 24 is connected **to provide the audible part** of the invention.”).

51. No additional structure is necessary to perform the functions of “displaying,” “providing,” or “generating” the graphical/visual or audio stimuli to the user.

² Throughout this declaration, all emphasis is added unless otherwise indicated.

(b) Amplify’s Proposed Constructions Import Unnecessary Structure

52. The claims in which the “displaying,” “providing” and “generating” terms appear require the display, presentation, or generation of graphical images and visual or audio/sound stimuli, and nothing more. Amplify’s construction adds additional structure—a browser and HTTP protocol—that is not necessary for performing the recited functions. A person of ordinary skill in the art would understand that neither a browser—which is simply one of many applications that can render information on a display—nor the HTTP protocol—which describes the set of commands used by computers to communicate over a network—is necessary to perform the function of displaying, presenting, or generating graphics or audio. Rather, a display or speaker is the appropriate structure to perform the function of displaying or presenting graphics or audio.

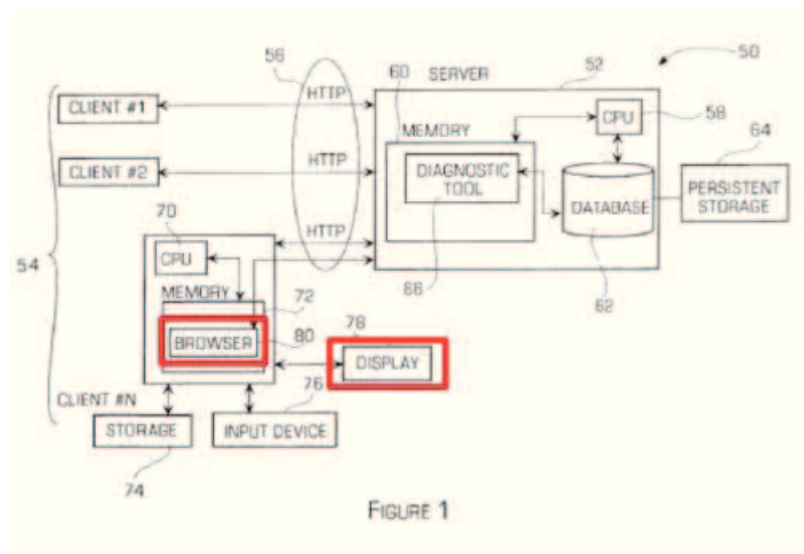
53. Indeed, the patent discloses non-Web page-based embodiments, such as a local area network, or a local CD-based embodiment, which would not require a browser for viewing Web pages. *See, e.g.*, ’452 patent at 3:55-59 (“In more detail, the diagnostic system in accordance with a preferred embodiment of the invention may include one or more software applications that may be stored on a portable media, such as ***a CD or a zip disk or may be stored on a server.***”); *id.* at 5:55-59 (“It will be appreciated, however, that the system and method in accordance with the invention has greater utility since it may be implemented on other types of computer systems, such as the Internet, a ***local area network***, a wide area network or any other type of computer network.”); *see also* ’147 patent at 3:57-61 (“In the presently preferred embodiment, the auditory logic 12, phonological game logic 14, and acoustic enhancement logic 26 are loaded to be run on the microprocessor 10 of a personal computer by ***providing these programs on a compact disk or other suitable disks.***”).

54. Further, the file history also discloses a non-Web based embodiment, such as the CD-ROM:

The various embodiments of the diagnostic system may be implemented using different computer systems. For example, the diagnostic system may be web based with a server and many clients so that people can access the diagnostic testing over the World Wide Web. As another example, the system may be implemented some portable media, such as a CD-ROM, wherein the diagnostic testing system is entirely contained on the CD-ROM and may be run from the CD-ROM or copied onto a local server at a facility, such as a school. Both the web-based embodiment and the CD-ROM based embodiment provide the same automatic diagnosis and training module recommendation to the user.

'452 File History, 3/30/2001 Response to Office Action dated 11/7/2000, at 5.

55. Moreover, the specification makes clear that both the browser and HTTP protocol are structures that perform functions other than displaying, providing, or generating. The browser permits a user to interact with a Web page-based embodiment of the invention. *See* '452 patent at 6:45-54 ("Each client computer *may* also include a browser application 80 that ... *may permit the user of the client computer to interact with the Web pages being downloaded from the server 52.*"). Indeed, the browser is located in an entirely separate structure from the display:



'452 patent at Fig. 1 (red boxes added).

56. Similarly, the HTTP protocol relates to a particular set of communications between devices that communicate via the Internet. It is not required for performing the function of displaying, providing or generating graphical, visual, or audio stimuli. Indeed, the HTTP protocol is not even required for the separate communications functions, as the patent discloses embodiments using communications protocols *other than* HTTP. '452 patent at 6:6-10 ("In the embodiment shown, the communications network is the Web and a *typical Web communications protocol*, such as the hypertext transfer protocol (HTTP), *may be used* for communications between the server and the client computer.").

(ii) **Means-Plus-Function Terms Relating to Receiving a User Input**

Claim Term	Function (Agreed Unless Otherwise Noted)	Heinemann's Proposed Structure	Amplify's Proposed Structure
"means for receiving a user response" (claims 1, 11, 14, 62, 65)	receiving a user response	'452 Patent: Input device 76 shown in Figure 1; Input device 76 such as a keyboard, a mouse, a joystick, a speech recognition microphone or the like; and/or Response buttons 198, 200, such as the "Yes" and "No" buttons (<i>e.g.</i> , as shown in Figure 6).	Input Device 76 (Fig.1) & Browser 80 (Fig.1) & HTTP protocol (col. 6, lines 6-13).
"means for receiving user input" (claims 7, 58)	receiving user input		
"means for receiving a response" (claims 8, 9, 10, 12, 16, 59, 60, 61, 63, 67)	receiving a response		
"means for receiving a user's response" (claims 17, 68)	receiving a user's response		
"means for generating a response to the tests" (claim 52)	generating a response to the tests	'147 Patent: Keyboard 18, pointing device 20 shown in Figure 1; speech recognition system; and/or the pointing input device 22 may be, for example, a mouse, track ball,	Display 78 (Fig.1) & Browser 80 (Fig.1) & Input Device 76 (Fig.1) & HTTP protocol (col. 6, lines 6-13).

Claim Term	Function (Agreed Unless Otherwise Noted)	Heinemann's Proposed Structure	Amplify's Proposed Structure
		touch pad, etc.	
"means for segmenting the stimulus into smaller units" (claims 12, 63)	segmenting the stimulus into smaller units	<u>'452 Patent</u> : Input device 76 shown in Figure 1; Input device 76 such as a keyboard, a mouse, a joystick, a speech recognition microphone or the like; and/or Response buttons 198, 200, such as the "Yes" and "No" buttons (<i>e.g.</i> , as shown in Figure 6).	The structure disclosed corresponding to the claimed function is the user.
"means for manipulating the sound units of the sound stimulus" (claims 13, 64)	<u>Heinemann</u> : manipulating the sound units of the sound stimulus <u>Amplify</u> : manipulating the sound units of the sound stimulus in response to the sound stimulus	<u>'147 Patent</u> : Keyboard 18, pointing device 20 shown in Figure 1; speech recognition system; and/or the pointing input device 22 may be, for example, a mouse, track ball, touch pad, etc.	
"means for speaking a/the verbal response into the speech recognition device" (claims 6, 57)	speaking a/the verbal response into the speech recognition device	<u>'452 Patent</u> : a microphone.	This phrase is indefinite under 35 U.S.C. § 112. For example, "speech recognition device" has no antecedent basis. Further, "the verbal response" in claim 6 also has no antecedent basis. To the extent the claim is amenable to construction, the structure disclosed corresponding to the claimed function is the user.
"means for speaking the name of or the sound associated with the visual stimulus" (claims 15, 66)	<u>Heinemann</u> : speaking the name of or the sound associated with the visual stimulus <u>Amplify</u> : speaking the name of or the sound associated with the visual stimulus ... using the speech recognition device		

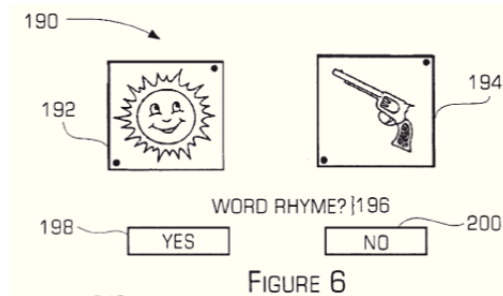
57. The second category of means-plus-function terms relate to receiving some type of input from a user by a client or apparatus. I understand that the parties agree that the disputed terms are means-plus-function terms and that both parties agree on the function associated with all but two of the terms. In addition, I understand that the parties agree that the corresponding structure is an “input device.” I agree with those positions.

(a) Heinemann’s Proposed Constructions Are Correct

58. I understand that the dispute between the parties regarding two of the functions centers on whether the function should include the stimulus preceding the claimed function (“in response to the sound stimulus”) or the structure where the response is input (“using the speech recognition device”). I further understand that the dispute with respect to the proper structure centers on whether the “input device” that the parties agree is part of the structure should be further defined with explicit examples from the specification (*e.g.*, keyboard, mouse, touch pad, etc.)—as Heinemann proposes—and whether to add additional structure (a browser, HTTP protocol and, in one case, a display)—as Amplify proposes. Amplify also argues that the structure for four of the terms is the user him-or-herself.

59. I conclude that Heinemann’s construction is correct, as it further identifies examples of what an input device is, which is helpful to lay persons, and because Amplify’s construction imports structure that is unnecessary to perform the claimed functions.

60. Heinemann’s proposed construction is supported by the specification, which identifies “an input device 76 such as a keyboard, a mouse, a joystick, a speech recognition microphone or the like” as the structure for receiving user inputs by the client computer. ’452 patent at 6:38-43. Other types of input devices, such as a mouse, touch pad, and on-screen response buttons (shown below in Fig. 6) are also disclosed:



'452 patent at Fig. 6, 10:61-63 ("The image may also include ... one or more response buttons 198, 200, such as the 'Yes' button and the 'No' button in this example."); '147 patent at 3:41-47 ("The microprocessor 10 is connected to an *input device such as a keyboard* 18. Preferably, the invention may also comprise an *input device* in the form of a *pointing device* 22. The pointing input device 22 may be, for example, *a mouse, track ball, touch pad*, etc."); *id.* at 4:18-20 ("The player *uses the keyboard 18 and/or the pointer device 20 to respond* to the test using a cursor on the display screen 16.").

61. Heinemann's construction is also supported by the specification where the function is limited to audio inputs (*e.g.*, "means for speaking a/the verbal response into the speech recognition device" and "means for speaking the name or the sound associated with the visual stimulus"). The specification is clear that a microphone is the structure used for receiving inputs from the user when the user is speaking. '452 patent at 6:42-43 ("a speech recognition microphone or the like"); *id.* at 8:4-7 ("[T]he child may see one or more items on the computer screen in rapid succession, *speak the name of each item into a microphone* that is interpreted by the speech recognition software in the client computer. . . ."); *id.* at 15:9-10 ("The user then repeats the sequence back using an *input device such as a microphone....*").

(b) **Amplify's Proposed Constructions Improperly Define The Claimed Function For Two Terms And Import Unnecessary Structure**

62. For two of the claimed functions, Amplify’s construction imports additional limitations to require that “manipulating the sound units of the sound stimulus” must be *in response to the sound stimulus* and that “speaking the name of or the sound associated with the visual stimulus” requires *using the speech recognition device*. I conclude that these additional phrases are not part of the function for the term to be construed, but are rather separate and distinct limitations that describe: (1) the stimulus that precedes the claimed function (*i.e.*, “in response to the sound stimulus”); or (2) the structure to be used for performing the function (*i.e.*, “using the speech recognition device.”).

63. With respect to structure, Amplify agrees that “input device 76” is the correct structure for receiving a user response/input, but adds three additional limitations to that structure: browser 80, display 78, and HTTP protocol. None of these structures is necessary to perform the claimed functions.

64. As I explained above, a browser is an example of a structure for rendering Web pages on a display. In contrast, the claimed functions relate to a user physically entering data into a client computer or apparatus, which is accomplished by direct human interaction with the client through input devices, such as a keyboard, mouse, or touch pad. Further, HTTP is one example of a communications protocol, which is the structure used for client-server communications over a network—a completely separate function from receiving a user input. Moreover, the communications protocol structure is included in some—but not all—of the asserted claims. Even functions related to client-server communications do not require HTTP as the structure, as the patent explicitly discloses that the structure for such functions is a communications protocol, and that HTTP is simply the protocol used in the Web page-based embodiment. *See, e.g.*, ’452 patent at 6:6-10 (“In the embodiment shown, the communications

network is the Web and a typical Web communications protocol, *such as* the hypertext transfer protocol (HTTP), *may* be used for communications between the server and the client computer.”), claim 1 (“means for communicating the responses ... back to the server computer”).

65. Finally, a display is an *output*—not *input*—device. Amplify’s identification of a “display” does not describe an input device. Heinemann’s construction, on the other hand, provides that a “touch pad” and on-screen “response buttons” are examples of an input device, and therefore accounts for touchscreen displays that can be used for user input. *See* ’452 patent at 10:60-63 (“The image may also include displayed instructions 196 from the module and one or more response buttons 198, 200, such as the “Yes” button and the “No” button in this example.”), Fig. 6.

(c) A Person Of Ordinary Skill In The Art Would Not Find The Terms To Be Indefinite Or Understand The Structure To Be The User

66. Amplify argues that two claim terms are indefinite—“means for speaking a/the verbal response into the speech recognition device” and “means for speaking the name of or the sound associated with the visual stimulus”—because the terms “speech recognition device” and “the verbal response” lack antecedent basis. I disagree with Amplify’s assertion. I understand that even where a claim term lacks an antecedent basis, if the scope of the claim would be nevertheless reasonably ascertainable by those skilled in the art, then the claim is not indefinite. Here, a person of ordinary skill in the art would readily recognize that “the speech recognition device” refers to the method of input for the “verbal response,” which is one of the ways in which a user can provide input to the client computer of claim 1. Similarly, a person of ordinary skill in the art would have understood that the “the verbal response” is the input that the function of “speaking” provides to the speech recognition device.

67. With respect to Amplify’s argument that the structure for four of the terms is “the user,” I disagree. For two of the terms—“means for speaking a/the verbal response into the speech recognition device” and “means for speaking the name of or the sound associated with the visual stimulus”—the appropriate structure is a microphone. A microphone is the structure used for “speaking” responses “*into* the speech recognition device,” as required by claims 6 and 57, or “speaking” the name of a sound “*using* the speech recognition device,” as required by claims 15 and 66. This understanding is consistent with my experience in the field of user interfaces and client-server architectures and communications.

68. Moreover, the ’452 patent specification supports Heinemann’s construction that the structure corresponding to the “speaking” responses “into” or “using” a speech recognition device is a microphone. Specifically, in each instance where the ’452 patent describes a user “speaking” an input, it is through the use of a microphone. *See, e.g.*, ’452 patent at 6:38-43 (“Each client computer 54 may include...a speech recognition microphone”), *id.* at 7:66-8:3 (“The diagnostic tool may also include speech recognition software that permits the various tests described below, to be used in conjunction with speech recognition technology (a microphone and speech recognition software) on the client computer.”), *id.* at 15:35-37 (“[T]he user is asked to name all of the items in the array as fast as possible in step 488 using an input device such as a microphone of a speech recognizer.”).

69. Similarly, for the other two terms where Amplify identifies “the user” as the structure—“means for segmenting the stimulus into smaller units” and “means for manipulating the sound units of the sound stimulus”—Amplify’s proposed structure is incorrect. The plain language of the claims confirms that the “segmenting” and “manipulating” means are part of a system that includes a client computer (claims 12, 13) or apparatus (claims 63, 64), and thus the

corresponding structure cannot be a user. Further, the means for segmenting is part of the “means for receiving a response” within the client computer (claim 12) or apparatus (claim 63). Both parties agree that “means for receiving a response” includes a non-human input device 76 shown in Figure 1. The functions for the manipulating and segmenting limitations relate to providing an input to a client computer or apparatus. A person of ordinary skill in the art would have understood that the way in which an input is entered into a client computer or apparatus is through use of an input device, such as a keyboard, a mouse, a joystick, a speech recognition microphone, input buttons, touch pad with on-screen buttons, or track ball.

70. Moreover, the specification confirms that the structure corresponding to the means for segmenting and manipulating is an input device, not a user him-or-herself:

Each client computer 54 may include...an input device 76 such as a keyboard, a mouse, a joystick, a speech recognition microphone or the like.

’452 patent at 6:38-43.

Figure 13 is a flowchart illustrating a method 390 for testing a child’s ability to ***segment*** sounds in which the user’s ability to ***segment*** a unit of sound, such as a word....[I]n the example shown in FIG. 16, the sentence ‘I have two brothers’ was presented to the user, ***the user activated an input device (clicked the mouse button, hit a key or spoke into the microphone)*** four times to indicate that four words were heard, and four items 395 are shown on the display.

Id. at 13:61-14:9.

Figure 15 is a flowchart illustrating a method 420 for testing a child’s ability to ***manipulate*** sounds...In step 428, the user is asked to rearrange the blocks shown or use the available other blocks (as shown in FIG. 16) to form a new word and user rearranges the blocks ***with an input device***.

Id. at 14:27-41.

(iii) Means-Plus-Function Terms Relating To Client-Server Communications

Claim Term	Agreed Function	Heinemann's Proposed Structure	Amplify's Proposed Structure
"means for communicating the responses for each test back to the server computer" (claim 1)	communicating the responses for each test back to the server computer	<u>'452 Patent:</u> Client computer using a communication protocol.	Browser 80 (Fig.1) & HTTP protocol (col. 6, lines 6-13).
"means for downloading one or more tests" (claim 52)	downloading one or more tests		
"means for receiving a recommendation" (claim 52)	receiving a recommendation		
"means for receiving a score" (claim 52)	receiving a score		No corresponding structure, therefore this phrase is indefinite under 35 U.S.C. § 112.
"means for receiving responses" (claim 35)	receiving responses	<u>'452 Patent:</u> Server using a communication protocol.	User Interface 100 (Fig.2) & HTTP protocol (col. 6, lines 6-13).
"means for receiving a response" (claims 42, 43, 44)	receiving a response		
"means for receiving a user response" (claims 45, 48)	receiving a user response		
"means for receiving a user's response" (claim 51)	receiving a user's response		
"means for generating ... stimulus" (claims 42-44)	generating ... stimulus		
"means for generating at least two sound stimuli" (claim 45)	generating at least two sound stimuli		
"means for generating at least one sound stimulus" (claim 48)	generating at least one sound stimulus		
"means for generating a plurality of visual stimuli" (claim 51)	generating a plurality of visual stimuli		

71. The third category of means-plus-function terms relate to client-server communications, including receiving data by a client computer or apparatus (*e.g.*, “means for downloading. . .” in claim 52), sending data from a client computer or apparatus to a server (*e.g.*, “means for communicating the responses for each test back to the server computer” in claim 1), receiving data by a server (*e.g.*, “means for receiving responses” in claim 35), or sending data from a server to a client computer or other apparatus (*e.g.*, “means for generating a plurality of visual stimuli” in claim 51). I understand that the parties agree that the disputed terms are means-plus-function terms and that both parties agree on the function associated with each of the terms. In addition, I understand that the parties agree that the corresponding structure includes at least a client, apparatus, or server, as well as a communications protocol. I agree with those positions.

72. I understand that the dispute between the parties with respect to the proper structure centers on: (1) whether the communications protocol that both parties agree is part of the structure should be limited to HTTP (as Amplify proposes); and (2) whether the structure should additionally require particular aspects of the client or server, such as a browser (for the client) or user interface (for the server) (as Amplify proposes).

73. Amplify also argues that the “means for receiving a score” is indefinite.

74. Based on my examination of the claims and specification, I conclude that: (1) the communications protocol should not be limited to the HTTP protocol; (2) a browser and user interface are unnecessary for performing the claimed function and therefore should not be construed as part of the structure; and (3) the term “means for receiving a score” is not indefinite.

(a) Heinemann’s Proposed Constructions Are Correct

75. Heinemann’s proposed construction is consistent with my understanding of what a person of ordinary skill would have understood at the time of the invention, and is confirmed

by the specification. The way in which a client, apparatus or similar device and a server communicate over a network is through the use of a communications protocol by a client computer or server. Each of the disputed terms involves receiving or transmitting information between a client and server. A person of ordinary skill in the art at the time of the '452 invention would have readily understood that the structure on the client, apparatus, or server that makes sending or receiving communications possible is the communications protocol by which each device abides. As explained above, a communications protocol defines the set of “rules” that two devices use to communicate with each other, such that they can each “understand” the other.

76. The specification confirms my conclusion. Specifically, the specification confirms that the structure that makes client-server communications possible is a communications protocol. '452 patent at 6:6-10 (“In the embodiment shown, the communications network is the Web and a *typical Web communications protocol*, such as the hypertext transfer protocol (HTTP), may be used *for communications between the server and the client computer.*”).

(b) Amplify’s Proposed Constructions Import Unnecessary Structure

77. Amplify agrees that that the structure for client-server communications is a client or server running a communications protocol, but limits that structure to the HTTP protocol, and also requires that the client include a browser and that the server include a user interface. I disagree.

78. As mentioned above, the specification expressly discloses using any “communications protocol,” which is structure readily understood by persons of ordinary skill in the art, and describes HTTP only as the protocol used in a preferred embodiment. '452 patent at 6:6-10 (“*In the embodiment shown*, the communications network is the Web and a typical Web

communications protocol, *such as* the hypertext transfer protocol (HTTP), may be used for communications between the server and the client computer.”). The use of the transition phrase “such as,” and the express reference to “the embodiment shown,” demonstrate that the specification more broadly describes “communications protocol[s]” generally, and only provides the HTTP protocol as an example in the particular embodiment being described.

79. Further, the browser and HTTP protocol are typically used for communications over the Internet, and the specification broadly provides that client-server communications may occur on communication networks other than the Internet. ’452 patent at 5:55-59 (“It will be appreciated, however, that the system and method in accordance with the invention has greater utility since it may be implemented on other types of computer systems, such as the Internet, a local area network, a wide area network or any other type of computer network.”). This is consistent with the patent’s disclosure of “communications protocol[s]” generally, depending on the particular “type of computer network” employed. For example, a person of ordinary skill in the art would understand that a local area network (LAN)—typically a network limited geographically, such as within an office or school—may utilize a communications protocol that is different from that used for a wide area network or a personal area network.

80. A person of ordinary skill in the art would further understand that a browser is simply one of many applications that can render information on a display, and is not necessary for performing client-server communications. In addition, a person of ordinary skill in the art would understand that a user interface does not have to be part of the structure that enables server-side communications because the user interface is expressly described as an optional component of the server. *See* ’452 patent at 7:17-20 (“The server 52 *may include* the...diagnostic tool 66. The diagnostic tool *may further comprise* a user interface 100.”).

81. The term “speech recognition software” does not render the claim indefinite. Speech recognition software was widely available at the time of the invention, and a person of ordinary skill in the art would have therefore found the disclosure of such standard software as disclosing sufficient structure.

82. Finally, a person of ordinary skill in the art would understand that the structure corresponding to the “means for receiving a score” is the same as the structure for all the other “means for receiving” terms and that the term is not indefinite. A “score” is simply data that can be communicated between a client and server. All data, regardless of whether it represents a user response or a score, is communicated between the client and server in the same way. Client-server communications are indifferent to the content of data being exchanged. Thus, the same structure that applies to the other means-plus-function terms related to client-server communications would apply to the “means for receiving a score.”

B. Non-Means-Plus-Function Terms

83. There are 12 non -means-plus-function terms (or groups of terms) in dispute. For each of these terms, a person of ordinary skill in the art would readily understand the plain and ordinary meaning, such that no further construction is required.

(i) “individual” / “user” / “test taker”

Claim Term	Heinemann’s Proposed Construction	Amplify’s Proposed Construction
“individual” (claims 1, 3, 18-21, 35, 37, 52, 54)	Plain and ordinary meaning	Individual being tested.
“user” (claims 1, 4, 6-7, 10-11, 14, 16-17, 18, 21, 23-24, 27-28, 31, 33-34, 44-45, 48, 51, 55, 57-58, 61-62, 65, 67-68)	Plain and ordinary meaning	These three terms must have the same construction, otherwise one or more of the claims in which they appear are indefinite under 35 U.S.C. § Second 112.
“test taker” (claims 8-9, 25-26, 42-43, 59-60)	Plain and ordinary meaning	

(a) Heinemann’s Proposed Constructions Are Correct

84. I agree with Heinemann that the terms “individual,” “user,” and “test taker” would be readily understood by person of ordinary skill in the art and therefore require no further construction. A user of the device (*e.g.*, client computer) is the individual who interacts with the device. This person can, but is not required to be, the person being tested. My understanding is confirmed by the specification, which provides that an “individual user” may be the child being tested, a parent, or a test administrator:

Each client computer 54 ... may be used by ***an individual user, such as a parent of a child or a test administrator***, to access the diagnostic tool stored on the server.

'452 patent at 6:34-38.

The diagnostic tool 66 may also use a child's scores on the one or more tools in order to recommend to the ***user*** of the client computer (*e.g.*, ***the parent of the child***) which training tools ***the parent*** may consider downloading to help the child with any deficiencies.

Id. at 6:64-67.

In step 142, the questionnaire may display a first question to the ***user*** of the client computer, such as ***the parent of the child being tested***.

Id. at 9:27-29.

85. Nothing in the claim requires that each term should be limited to the individual “being tested” and, indeed, the specification expressly discloses other “users” of the invention. Furthermore, I understand that different terms are presumed to have different meanings and, therefore, each of these terms should be construed according to its ***own*** plain and ordinary meaning. The context of the claims makes it clear whether the term refers to the person being tested (*e.g.*, “[a] system for testing one or more skills ... ***of an individual***”) or, more broadly, the person who interacts with the device (*e.g.*, “means for receiving ***a user response*** to one of the graphical images and audio”). *See, e.g.*, '452 patent, claim 1.

(b) Amplify’s Proposed Constructions Limit The Claims To A Particular Embodiment

86. Amplify’s proposed construction limiting each of these terms to the “individual *being tested*” would exclude embodiments that are explicitly disclosed in the specification. Specifically, the ’452 patent discloses that individuals *other than* the individual being tested may be “users” of the invention. *See supra*. The prosecution history similarly explains that a parent may be a “user.” *See* ’452 File History, 3/30/2001 Response to Office Action dated 11/7/2000, at 5 (“The system permits people with various different knowledge levels ... to administer the diagnostic test. For example, *a parent ... may use the system to diagnose a deficiency in his/her child....*”). I also understand that different claim terms are presumed to have different meanings and, therefore, Amplify’s assertion that each term should be construed to have the same meaning is presumptively incorrect.

87. Finally, Amplify argues that if the terms are not construed the same way, “one or more” claims in which they appear are indefinite. While Amplify did not specify which claims it argues would be indefinite, I disagree that the claims would be rendered indefinite. For example, claim 8 refers to the “ability of the test taker to recognize the initial phoneme of the stimulus” during a test. Claim 8 depends from claim 1, which, as explained above, recites an “individual” whose “reading skills” are being tested, and also a “user” who actually operates the client computer of the claimed system. In this case, it would be “reasonably ascertainable”—indeed, it would be clear—to a person of ordinary skill in the art that “test taker” refers back to “individual,” but not necessarily to “user,” since the preamble of claim 1 recites that it is the individual’s reading skills that are being “test[ed].”

(ii) “client computer”

Claim Term	Heinemann’s Proposed Construction	Amplify’s Proposed Construction
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“client computer” (claims 1, 4, 55)	Plain and ordinary meaning	A computer in a client/server computer system that communicates with the server computer and that is used by the tested individual to enter test responses.
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(a) Heinemann’s Proposed Construction Is Correct

88. I agree with Heinemann that the term “client computer” would be readily understood by person of ordinary skill in the art and therefore requires no further construction. A client computer is simply the user-facing component in a client-server architecture, which can be a tablet, laptop, CPU, or any other device or software arranged in such an architecture. *See also*, Computer & Internet Dictionary (3d ed., 1999)] at 94 (“**client** The client part of a client-server architecture. . . . **client/server architecture** A network architecture in which each computer or process on the network is either a client or a server. . . . **client-side** Occurring on the client side of a client-server system.”) (emphasis in original).

89. The ’452 specification uses the term consistently with its plain and ordinary meaning:

Each client computer 54 may include a central processing unit (CPU) 70, a memory 72, a persistent storage device 74 such as a hard disk drive, a tape drive, an optical drive or the like, an input device 76 such as a keyboard, a mouse, a joystick, a speech recognition microphone or the like, and a display 78 such as a typical cathode ray tube, a flat panel display or the like. Each client computer may also include a browser application 80 that may be stored in the persistent storage device and downloaded to the memory 72 as shown in the figure.

’452 patent at 6:38-47; *id.* at 6:6-10 (“[A] typical Web communications protocol . . . may be used for communications between the server and the client computer.”).

(b) Amplify’s Proposed Construction Limits The Claims To A Particular Embodiment

90. I disagree with Amplify’s proposed construction for “client computer” because it improperly excludes embodiments expressly disclosed in the specification. As explained above,

the '452 patent is clear that individuals *other than* “the tested individual” may enter test responses into the client computer. '452 patent at 6:34-38 (Each client computer 54 ... may be used by *an individual user, such as a parent of a child or a test administrator*, to access the diagnostic tool stored on the server), *id.* at 6:64-67 (“The diagnostic tool 66 may also use a child's scores on the one or more tools in order to recommend to the *user* of the client computer (*e.g., the parent of the child*) which training tools *the parent* may consider downloading to help the child with any deficiencies.”), *id.* at 9:27-29 (“In step 142, the questionnaire may display a first question to the *user* of the client computer, such as *the parent of the child being tested.*”); '452 File History, 3/30/2001 Response to Office Action dated 11/7/2000, at 5 (“The system permits people with various different knowledge levels ... to administer the diagnostic test. For example, *a parent ... may use the system to diagnose a deficiency in his/her child....*”).

(iii) “server computer” and “server”

Claim Term	Heinemann's Proposed Construction	Amplify's Proposed Construction
“server computer” (claims 1, 52) “server” (claims 2, 35-37, 39, 42-45, 48, 51-52)	Plain and ordinary meaning	A computer in a client/server computer system that stores tests, which are downloaded by a client computer, and scores the tests and recommends training modules based on the scores of the tests.

(a) **Heinemann's Proposed Construction Is Correct**

91. I agree with Heinemann that the terms “server” and “server computer” would be readily understood by a person of ordinary skill in the art and therefore require no further construction. A “server computer” or “server” is simply the back-end component in a client-server architecture that responds to requests from a client.

92. The '452 specification uses the terms consistently with their plain and ordinary meaning:

The server may further comprise a central processing unit (CPU) 58, a memory 60, a database (DB) 62, a persistent storage device 64 and a diagnostic tool 66...[t]he server may also include the necessary hardware and software to accept requests from one or more client computers.

'452 patent at 6:14-29.

(b) Amplify's Proposed Constructions Improperly Import Limitations Into The Claims

93. I disagree with Amplify's proposed construction for "server" and "server computer" because it renders other claim language redundant and imports limitations from the specification and other claims, where no such limitations are recited. For example, claim 1 already recites a "server computer" that "compris[es] one or more tests [and] a scorer" and "further comprises a recommender," and that a "client computer[] ... may establish a communications session with the server computer to download one or more tests from the server computer." '452 patent, claim 1. Amplify's construction would render this language in claim 1 redundant. On the other hand, claim 35 recites a "server" that similarly includes "a scorer" and a "recommender," but does not require that tests are "downloaded by a client computer," so it would be improper to import those additional limitations into a claim where they are not recited. Where the claims require the server to have certain components, they state so explicitly.

(iv) "scorer" and "scoring"

Claim Term	Heinemann's Proposed Construction	Amplify's Proposed Construction
"scorer" (claims 1 and 35)	Plain and ordinary meaning	A portion of a system for testing an individual's reading and pre-reading skill(s) that is located on the server computer.
"scoring" (claim 18)	Plain and ordinary meaning	Determining scores of one or more tests by a server computer without human interaction.

(a) Heinemann's Proposed Constructions Are Correct

94. I agree with Heinemann that the terms “scorer” and “scoring” would be readily understood by person of ordinary skill in the art and therefore require no further construction. In the context of the claims, which are directed to a computer-based system for testing reading skills, scoring is performed by a scorer, which can be implemented in either hardware or software, and simply keeps track of a user’s responses and determines whether they match an expected response, *i.e.*, determining whether they are “right,” and/or keeps track of statistics related to those responses.

95. The specification of the ’452 patent is consistent with this plain and ordinary meaning, explaining that, for example, “the module may determine the score of the child in step 552 wherein the score is calculated as a percentage of items that have been correctly answered.” ’452 patent at 16:47-50.

(b) Amplify’s Proposed Constructions Improperly Import Limitations Into The Claims

96. I disagree with Amplify’s construction, which requires that the “scorer” be “located on the server computer” and that “scoring” be performed “by a server computer” and “without human interaction,” because it renders other claim language redundant or imports limitations into claims where no such limitations are recited. For example, claim 35 is directed to “[a] server...comprising...a scorer for determining a score for each test.” In stark contrast, claim 18—the only claim in which the term “scoring” appears—includes no limitation that a scorer, which would perform the “scoring,” be located on a server computer or be performed “without human interaction.”

(v) “test”

Claim Term	Heinemann’s Proposed Construction	Amplify’s Proposed Construction
“test” (claims 1, 4-5, 7-17, 18, 21-22, 24-	Plain and ordinary meaning	An assessment of an individual’s reading and pre-reading skills, which are

34, 35, 39, 42-45, 48, 51, 52, 55-68)		downloaded by a client computer, and scores the tests and recommends training modules based on the scores of the tests.
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(a) Heinemann’s Proposed Construction Is Correct

97. I agree with Heinemann that the term “test” would be readily understood by person of ordinary skill in the art and therefore require no further construction. A “test” is simply a mechanism for measuring skill, knowledge, proficiency or other capacity. The ’452 patent uses the term “test” consistently with this plain and ordinary meaning. *See, e.g.,* ’452 patent, 7:26-29 (“[the test] may be used to determine a child’s proficiency at a particular ... skill.”). In addition, during prosecution the applicants explicitly stated that they intended “test,” as it appears in the ’452 patent, to carry its plain and ordinary meaning. *See* 3/30/01 Response Under 37 C.F.R. §1.121 at 5 (“In particular, the term ‘test’ is used in its ordinary meaning of a mechanism for testing a particular aspect of a user...”).

(b) Amplify’s Proposed Construction Improperly Import Limitations Into The Claims

98. I disagree with Amplify’s proposed construction for “test” because it requires the tests to be “downloaded by a client computer,” which would render other claim language redundant or import limitations from other claims where no such limitations exist. For example, claim 1 already recites “one or more client computers that may ... download the one or more tests from the server computer.” On the other hand, claim 18 includes no such requirement, and makes no mention at all of the tests being “downloaded by a client computer.” *Id.* at claim 18.

99. Further, Amplify’s construction defines the “test” to be “[a]n assessment of an individual’s reading and pre-reading skills.” However, the dependent claims specify the types of tests covered by each claim, and there is no reason to further define the term.

100. Amplify’s construction is also incorrect to the extent that it requires the “test” to “score[] the tests and recommend[] training modules based on the scores of the tests.” The “test” does not “score the tests.” Claim 1, for example, claims a “scorer” that scores the tests. Nor does the “test” “recommend[] training modules,” as claim 1, for example, separately recites a “recommender” that makes recommendations.

(vi) **“receiving a user/user’s response,” “receiving a response,” and “receiving user input,” and “receiving responses”**

Claim Term	Heinemann’s Proposed Construction	Amplify’s Proposed Construction
“receiving a user/user’s response” (claims 1, 11, 14, 17, 28, 31, 34, 62, 65, 68) “receiving a response” (claims 8-10, 12, 16, 18, 25, 27, 29, 33, 59-61, 63, 67) “receiving user input” (claims 7, 24, 58)	Plain and ordinary meaning	Receiving response(s) on the client computer entered by the tested individual without guidance or assistance from a teacher or other skilled person.
“receiving a user/user’s response” (claims 45, 48) “receiving a response” (claims 42-44) “receiving responses” (claim 35)	Plain and ordinary meaning	Receiving a response(s) from a client computer that was/were entered by the tested individual on the client computer without guidance or assistance from a teacher or other skilled person.

(a) **Heinemann’s Proposed Construction Is Correct**

101. I agree with Heinemann that the “receiving...” terms would have been readily understood by persons of ordinary skill in the art and therefore do not require further construction. The context of the claims make clear whether the “receiving” is done at the client (*see, e.g.*, ’452 patent at claim 1 (“each client computer comprising ... means for receiving a user response. . . .”) or at the server (*see, e.g., id.* at claim 35 (“[a] server ... comprising ... means for receiving responses. . . .”). Persons of ordinary skill in the art would readily understand that receiving responses from a user at a client involves using input devices to receive responses directly from the user. Similarly, at a server, where there is no direct interaction with the user, a

person of ordinary skill in the art would understand that “receiving” responses refers to the communications received by the server from the client.

102. Thus, for the claims directed to a client, each term refers to the process of receiving an input from a user via some type of input device, such as a keyboard, mouse, touch pad, on-screen buttons, etc. Similarly, for claims directed to a server, each term refers to the communications protocol used by a server to receive inputs and responses from a client over a network.

(b) Amplify’s Proposed Constructions Limit The Claims To A Particular Embodiment

103. I disagree with Amplify’s proposed constructions because they improperly limit the claims to a single embodiment. The claims do not require that “the tested individual” “enter[]” the responses “without guidance or assistance from a teacher or other skilled person,” as Amplify proposes. Indeed, the specification expressly discloses embodiments where “the tested individual” does not enter the responses him-or-herself. *See, e.g.*, ’452 patent at 6:34-38 (“Each client computer 54 ... may be used by an individual user, *such as a parent of a child or a test administrator*, to access the diagnostic tool stored on the server.”). This is confirmed by the file history, where the applicants expressly stated that persons other than “the tested individual” may provide the responses. ’452 File History, 3/30/2001 Response to Office Action dated 11/7/2000, at 5 (“The system permits people with various different knowledge levels ... to administer the diagnostic test. For example, *a parent* ... may use the system to diagnose a deficiency in his/her child....”).

(vii) “presenting” and “displaying at least one of a graphical image and audio”

Claim Term	Heinemann’s Proposed Construction	Amplify’s Proposed Construction
“presenting” (claim	Plain and ordinary	Presenting to the tested individual without

18)	meaning	human intervention or guidance or assistance from a teacher or other skilled person.
“displaying at least one of a graphical image and audio” (claim 1)	Plain and ordinary meaning	Presenting on a client computer to the tested individual a graphical image or audio without human intervention or guidance or assistance from a teacher or other skilled person.

(a) Heinemann’s Proposed Constructions Are Correct

104. I agree with Heinemann that the terms “presenting” and “displaying at least one of a graphical image and audio” would have been readily understood by persons of ordinary skill in the art at the time of the invention. Presenting or displaying images, audio, or other stimuli to a user are well-understood concepts that require no further construction. The ’452 specification uses the terms consistently with their plain and ordinary meaning, and confirms that they simply refer to providing an output either visually using, *e.g.*, a display, or audibly using, *e.g.*, a speaker. *See, e.g.*, ’452 patent at 4:26-27 (“The method comprises **presenting** one or more stimuli to the individual”), *id.* at 8:22-23 (“each test 102 may **display images** on the display. . . .”), *id.* at 9:34-35 (“present the next question to the user if there are additional questions”), *id.* at 10:6-14 (“[T]he rhyme recognizing module may **display two words along with their pictures** on the user’s display screen. . . . For example, the module may **display the picture** of a sun and a picture of a gun. . . . [T]he module may **display text** below the pictures asking the user if the two words rhyme. . . . [T]he module may **present a verbal prompt** asking the user if the two words rhyme since the users of the system may not be able to read.”), *id.* at 14:4-5 (“In the example shown in FIG. 16, the sentence ‘I have two brothers’ was **presented** to the user. . . .”), *id.* at 14:31-32 (“In step 422, the user is **presented with a spoken word**.”); *see also* ’147 patent at 3:11-13 (“The system includes a **speaker system which provides the audible part** of the games”); *id.* at 3:46-47 (“A **speaker, or speaker system**, 24 is connected **to provide the audible part** of the invention.”).

(b) Amplify’s Proposed Constructions Limit The Claims To A Particular Embodiment

105. I disagree with Amplify’s proposed constructions, which require “presenting to the tested individual” and preclude “human intervention or guidance or assistance from a teacher or other skilled person,” because they limit the claims to a single embodiment and are inconsistent with the ’452 specification. The specification explicitly discloses that “presenting” and “displaying at least one of a graphical image and audio” may be to persons other than the tested individual and be performed *with* “human intervention or guidance or assistance from a teacher or other skilled person.” See ’452 patent at 6:34-38 (“Each client computer 54 ... may be used by *an individual user, such as a parent of a child or a test administrator*, to access the diagnostic tool stored on the server.”), *id.* at 6:63-67 (“The diagnostic tool 66 may also use a child’s scores on the one or more tools in order to recommend to the *user* of the client computer (*e.g., the parent of the child*) which training tools *the parent* may consider downloading to help the child with any deficiencies.”), *id.* at 9:27-29 (“In step 142, the questionnaire may display a first question to the *user* of the client computer, such as *the parent of the child being tested.*”).

VI. HEARING AND TRIAL EXHIBITS

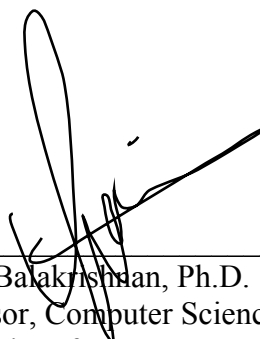
106. At any hearing that may be held on claim construction or at trial, I may rely on visual aids and demonstrative exhibits that demonstrate the bases of my opinions. Examples of these visual aids and demonstrative exhibits may include, for example, claim charts, patent drawings, excerpts from patent specifications, reexaminations, file histories, interrogatory responses, deposition testimony, deposition exhibits, published articles, and dictionaries, as well as optical components, charts, diagrams, videos, and animated or computer-generated video.

VII. SUPPLEMENTATION OF OPINIONS

107. I understand that discovery is ongoing in this case. I therefore reserve the right to adjust or supplement my opinions after I have had the opportunity to review any additional documents or evidence that may be brought to my attention. I also reserve the right to adjust or supplement my analysis in light of any critique of my declaration or alternative opinions advanced by or on behalf of Plaintiff.

I declare under penalty of perjury that the foregoing is true and correct.

Dated this 19th day of June 2014.

A handwritten signature in black ink, appearing to read 'Ravin Balakrishnan', is written over a horizontal line.

Ravin Balakrishnan, Ph.D.
Professor, Computer Science
University of Toronto